WHAT IS CLAIMED IS:

1. A method for manufacturing a photomask in which are arranged a light transmitting pattern portion and a light shielding pattern portion for forming an optical image pattern on the surface of a substrate, comprising:

calculating a pattern area ratio, which is a ratio of the light transmitting pattern portion or the light shielding pattern portion to an area of the photomask from the design data of a given layout pattern of the photomask, and a pattern density, which is a ratio of said light transmitting pattern portion or light shielding pattern portion within said region to the area of the region extracted from the given layout pattern;

estimating from the calculated pattern area ratio and the pattern density the size of a pattern formed in the case where the pattern is formed on the photomask by using the design data of the given layout pattern; and

imparting the amount of correction to the design data of the given layout pattern based on the estimated pattern size.

2. The method for manufacturing a photomask according to claim 1, wherein the region extracted from said layout pattern is a region including a pattern requiring the highest dimensional accuracy among

the layout pattern.

3. The method for manufacturing a photomask according to claim 1, wherein the estimation of said pattern size is performed by using any of:

a first function representing the relationship between said pattern area ratio and the pattern size obtained by actually processing the photomask;

a second function representing the relationship between said pattern density and the pattern size obtained by actually processing the photomask; and

a third function representing the relationship between said pattern area ratio, said pattern density, and the pattern size obtained by actually processing the photomask.

4. The method for manufacturing a photomask according to claim 3, wherein said second function and said third function are obtained by measuring the pattern sizes of photomasks for evaluation processed by using a plurality of pattern data having patterns for the size measurement having a plurality of pattern densities arranged therein and differing from each other in the pattern area ratio.

5. A method for manufacturing a photomask in which a light transmitting pattern portion and a light shielding pattern portion are formed for forming a predetermined optical image pattern on the surface of a substrate, comprising:

calculating a pattern area ratio, which is a ratio of the area of the light transmitting pattern portion or the light shielding pattern portion to the area of a photomask, and a pattern density, which is a ratio of the area of said light transmitting pattern portion or the light shielding pattern portion within said region to the area of the region extracted from the given layout pattern based on a given design data of the layout pattern of the photomask;

estimating the positional accuracy of the formed pattern from the calculated pattern area ratio and the pattern density, covering the case where a pattern is formed in the photomask by using a given design data of the layout pattern; and

imparting a correction amount to the given layout pattern based on the estimated positional accuracy.

6. A method for manufacturing a photomask in which a light transmitting pattern portion and a light shielding pattern portion are arranged for forming a predetermined optical image pattern on the surface of a substrate, comprising:

calculating a pattern area ratio, which is a ratio of the area of the light transmitting pattern portion or the light shielding pattern portion to the area of the photomask, from the design data of a given layout pattern of the photomask, and a pattern density, which is a ratio of the area of the light transmitting

pattern portion or the light shielding pattern portion within said region to the area of the region extracted from the given layout pattern;

estimating the XY difference of the formed pattern from the calculated pattern area ratio and the pattern density, covering the case where a pattern is formed on the photomask by using the design data of the imparted layout pattern; and

imparting a correction amount to said imparted layout pattern based on the estimated XY difference.

7. A photomask formed on the basis of the layout pattern of the photomask corrected by employing the method of manufacturing a photomask defined in claim 1.

8. A method of manufacturing a semiconductor device, comprising forming a predetermined optical image pattern on the surface of a substrate by using the photomask defined in claim 7.

9. A photomask prepared on the basis of the layout pattern of the photomask corrected by employing the method of manufacturing a photomask defined in claim 5.

10. A method of manufacturing a semiconductor device, comprising forming a predetermined optical image pattern on the surface of a substrate by using the photomask defined in claim 9.

11. A photomask formed on the basis of the layout pattern of the photomask corrected by employing the

method of manufacturing a photomask defined in claim 6.

12. A method of manufacturing a semiconductor device, comprising forming a predetermined optical image pattern on the surface of a substrate by using the photomask defined in claim 11.